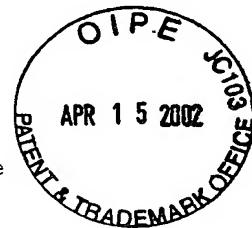


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<110> Matsuda, Seiichi P.T.  
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 <141> 2002-01-07

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aaaaaaaaa 2528

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<213> *Abies grandis*

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 <212> PRT  
 <213> *Abies grandis*

<400> 15

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Leu	Ser	Ser	Thr	Ser	Gly	Leu	Ile	Arg	Arg	Thr	Ala	Asn	Pro	His	Pro
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Asn	Val	Trp	Gly	Tyr	Asp	Leu	Val	His	Ser	Leu	Lys	Ser	Pro	Tyr	Ile
						35		40				45			

Asp	Ser	Ser	Tyr	Arg	Glu	Arg	Ala	Glu	Val	Leu	Val	Ser	Glu	Ile	Lys
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Ala Met Leu Asn Pro Ala Ile Thr Gly Asp Gly Glu Ser Met Ile Thr  
65 70 75 80

Pro Ser Ala Tyr Asp Thr Ala Trp Val Ala Arg Val Pro Ala Ile Asp  
85 90 95

Gly Ser Ala Arg Pro Gln Phe Pro Gln Thr Val Asp Trp Ile Leu Lys  
100 105 110

Asn Gln Leu Lys Asp Gly Ser Trp Gly Ile Gln Ser His Phe Leu Leu  
115 120 125

Ser Asp Arg Leu Leu Ala Thr Leu Ser Cys Val Leu Val Leu Leu Lys  
130 135 140

Trp Asn Val Gly Asp Leu Gln Val Glu Gln Gly Ile Glu Phe Ile Lys  
145 150 155 160

Ser Asn Leu Glu Leu Val Lys Asp Glu Thr Asp Gln Asp Ser Leu Val  
165 170 175

Thr Asp Phe Glu Ile Ile Phe Pro Ser Leu Leu Arg Glu Ala Gln Ser  
180 185 190

Leu Arg Leu Gly Leu Pro Tyr Asp Leu Pro Tyr Ile His Leu Leu Gln  
195 200 205

Thr Lys Arg Gln Glu Arg Leu Ala Lys Leu Ser Arg Glu Glu Ile Tyr  
210 215 220

Ala Val Pro Ser Pro Leu Leu Tyr Ser Leu Glu Gly Ile Gln Asp Ile  
225 230 235 240

Val Glu Trp Glu Arg Ile Met Glu Val Gln Ser Gln Asp Gly Ser Phe  
245 250 255

Leu Ser Ser Pro Ala Ser Thr Ala Cys Val Phe Met His Thr Gly Asp  
260 265 270

Ala Lys Cys Leu Glu Phe Leu Asn Ser Val Met Ile Lys Phe Gly Asn  
275 280 285

Phe Val Pro Cys Leu Tyr Pro Val Asp Leu Leu Glu Arg Leu Leu Ile  
290 295 300

Val Asp Asn Ile Val Arg Leu Gly Ile Tyr Arg His Phe Glu Lys Glu

305

310

315

320

Ile Lys Glu Ala Leu Asp Tyr Val Tyr Arg His Trp Asn Glu Arg Gly  
325 330 335

Ile Gly Trp Gly Arg Leu Asn Pro Ile Ala Asp Leu Glu Thr Thr Ala  
340 345 350

Leu Gly Phe Arg Leu Leu Arg Leu His Arg Tyr Asn Val Ser Pro Ala  
355 360 365

Ile Phe Asp Asn Phe Lys Asp Ala Asn Gly Lys Phe Ile Cys Ser Thr  
370 375 380

Gly Gln Phe Asn Lys Asp Val Ala Ser Met Leu Asn Leu Tyr Arg Ala  
385 390 395 400

Ser Gln Leu Ala Phe Pro Gly Glu Asn Ile Leu Asp Glu Ala Lys Ser  
405 410 415

Phe Ala Thr Lys Tyr Leu Arg Glu Ala Leu Glu Lys Ser Glu Thr Ser  
420 425 430

Ser Ala Trp Asn Asn Lys Gln Asn Leu Ser Gln Glu Ile Lys Tyr Ala  
435 440 445

Leu Lys Thr Ser Trp His Ala Ser Val Pro Arg Val Glu Ala Lys Arg  
450 455 460

Tyr Cys Gln Val Tyr Arg Pro Asp Tyr Ala Arg Ile Ala Lys Cys Val  
465 470 475 480

Tyr Lys Leu Pro Tyr Val Asn Asn Glu Lys Phe Leu Glu Leu Gly Lys  
485 490 495

Leu Asp Phe Asn Ile Ile Gln Ser Ile His Gln Glu Glu Met Lys Asn  
500 505 510

Val Thr Ser Trp Phe Arg Asp Ser Gly Leu Pro Leu Phe Thr Phe Ala  
515 520 525

Arg Glu Arg Pro Leu Glu Phe Tyr Phe Leu Val Ala Ala Gly Thr Tyr  
530 535 540

Glu Pro Gln Tyr Ala Lys Cys Arg Phe Leu Phe Thr Lys Val Ala Cys  
545 550 555 560

Leu Gln Thr Val Leu Asp Asp Met Tyr Asp Thr Tyr Gly Thr Leu Asp  
565 570 575

Glu Leu Lys Leu Phe Thr Glu Ala Val Arg Arg Trp Asp Leu Ser Phe  
580 585 590

Thr Glu Asn Leu Pro Asp Tyr Met Lys Leu Cys Tyr Gln Ile Tyr Tyr  
595 600 605

Asp Ile Val His Glu Val Ala Trp Glu Ala Glu Lys Glu Gln Gly Arg  
610 615 620

Glu Leu Val Ser Phe Phe Arg Lys Gly Trp Glu Asp Tyr Leu Leu Gly  
625 630 635 640

Tyr Tyr Glu Glu Ala Glu Trp Leu Ala Ala Glu Tyr Val Pro Thr Leu  
645 650 655

Asp Glu Tyr Ile Lys Asn Gly Ile Thr Ser Ile Gly Gln Arg Ile Leu  
660 665 670

Leu Leu Ser Gly Val Leu Ile Met Asp Gly Gln Leu Leu Ser Gln Glu  
675 680 685

Ala Leu Glu Lys Val Asp Tyr Pro Gly Arg Arg Val Leu Thr Glu Leu  
690 695 700

Asn Ser Leu Ile Ser Arg Leu Ala Asp Asp Thr Lys Thr Tyr Lys Ala  
705 710 715 720

Glu Lys Ala Arg Gly Glu Leu Ala Ser Ser Ile Glu Cys Tyr Met Lys  
725 730 735

Asp His Pro Glu Cys Thr Glu Glu Ala Leu Asp His Ile Tyr Ser  
740 745 750

Ile Leu Glu Pro Ala Val Lys Glu Leu Thr Arg Glu Phe Leu Lys Pro  
755 760 765

Asp Asp Val Pro Phe Ala Cys Lys Lys Met Leu Phe Glu Glu Thr Arg  
770 775 780

Val Thr Met Val Ile Phe Lys Asp Gly Asp Gly Phe Gly Val Ser Lys  
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Leu Glu Val Lys Asp His Ile Lys Glu Cys Leu Ile Glu Pro Leu Pro  
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Leu

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<213> Abies grandis

<400> 16

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20 25 30

Asn Pro Ala Ile Thr Gly Asp Gly Glu Ser Met Ile Thr Pro Ser Ala  
35 40 45

Tyr Asp Thr Ala Trp Val Ala Arg Val Pro Ala Ile Asp Gly Ser Ala  
50 55 60

Arg Pro Gln Phe Pro Gln Thr Val Asp Trp Ile Leu Lys Asn Gln Leu  
65 70 75 80

Lys Asp Gly Ser Trp Gly Ile Gln Ser His Phe Leu Leu Ser Asp Arg  
85 90 95

Leu Leu Ala Thr Leu Ser Cys Val Leu Val Leu Leu Lys Trp Asn Val  
100 105 110

Gly Asp Leu Gln Val Glu Gln Gly Ile Glu Phe Ile Lys Ser Asn Leu  
115 120 125

Glu Leu Val Lys Asp Glu Thr Asp Gln Asp Ser Leu Val Thr Asp Phe  
130 135 140

Glu Ile Ile Phe Pro Ser Leu Leu Arg Glu Ala Gln Ser Leu Arg Leu  
145 150 155 160

Gly Leu Pro Tyr Asp Leu Pro Tyr Ile His Leu Leu Gln Thr Lys Arg  
165 170 175

Gln Glu Arg Leu Ala Lys Leu Ser Arg Glu Glu Ile Tyr Ala Val Pro

180

185

190

Ser Pro Leu Leu Tyr Ser Leu Glu Gly Ile Gln Asp Ile Val Glu Trp  
195 200 205

Glu Arg Ile Met Glu Val Gln Ser Gln Asp Gly Ser Phe Leu Ser Ser  
210 215 220

Pro Ala Ser Thr Ala Cys Val Phe Met His Thr Gly Asp Ala Lys Cys  
225 230 235 240

Leu Glu Phe Leu Asn Ser Val Met Ile Lys Phe Gly Asn Phe Val Pro  
245 250 255

Cys Leu Tyr Pro Val Asp Leu Leu Glu Arg Leu Leu Ile Val Asp Asn  
260 265 270

Ile Val Arg Leu Gly Ile Tyr Arg His Phe Glu Lys Glu Ile Lys Glu  
275 280 285

Ala Leu Asp Tyr Val Tyr Arg His Trp Asn Glu Arg Gly Ile Gly Trp  
290 295 300

Gly Arg Leu Asn Pro Ile Ala Asp Leu Glu Thr Thr Ala Leu Gly Phe  
305 310 315 320

Arg Leu Leu Arg Leu His Arg Tyr Asn Val Ser Pro Ala Ile Phe Asp  
325 330 335

Asn Phe Lys Asp Ala Asn Gly Lys Phe Ile Cys Ser Thr Gly Gln Phe  
340 345 350

Asn Lys Asp Val Ala Ser Met Leu Asn Leu Tyr Arg Ala Ser Gln Leu  
355 360 365

Ala Phe Pro Gly Glu Asn Ile Leu Asp Glu Ala Lys Ser Phe Ala Thr  
370 375 380

Lys Tyr Leu Arg Glu Ala Leu Glu Lys Ser Glu Thr Ser Ser Ala Trp  
385 390 395 400

Asn Asn Lys Gln Asn Leu Ser Gln Glu Ile Lys Tyr Ala Leu Lys Thr  
405 410 415

Ser Trp His Ala Ser Val Pro Arg Val Glu Ala Lys Arg Tyr Cys Gln  
420 425 430

Val Tyr Arg Pro Asp Tyr Ala Arg Ile Ala Lys Cys Val Tyr Lys Leu  
435 440 445

Pro Tyr Val Asn Asn Glu Lys Phe Leu Glu Leu Gly Lys Leu Asp Phe  
450 455 460

Asn Ile Ile Gln Ser Ile His Gln Glu Glu Met Lys Asn Val Thr Ser  
465 470 475 480

Trp Phe Arg Asp Ser Gly Leu Pro Leu Phe Thr Phe Ala Arg Glu Arg  
485 490 495

Pro Leu Glu Phe Tyr Phe Leu Val Ala Ala Gly Thr Tyr Glu Pro Gln  
500 505 510

Tyr Ala Lys Cys Arg Phe Leu Phe Thr Lys Val Ala Cys Leu Gln Thr  
515 520 525

Val Leu Asp Asp Met Tyr Asp Thr Tyr Gly Thr Leu Asp Glu Leu Lys  
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Leu Phe Thr Glu Ala Val Arg Arg Trp Asp Leu Ser Phe Thr Glu Asn  
545 550 555 560

Leu Pro Asp Tyr Met Lys Leu Cys Tyr Gln Ile Tyr Tyr Asp Ile Val  
565 570 575

His Glu Val Ala Trp Glu Ala Glu Lys Glu Gln Gly Arg Glu Leu Val  
580 585 590

Ser Phe Phe Arg Lys Gly Trp Glu Asp Tyr Leu Leu Gly Tyr Tyr Glu  
595 600 605

Glu Ala Glu Trp Leu Ala Ala Glu Tyr Val Pro Thr Leu Asp Glu Tyr  
610 615 620

Ile Lys Asn Gly Ile Thr Ser Ile Gly Gln Arg Ile Leu Leu Leu Ser  
625 630 635 640

Gly Val Leu Ile Met Asp Gly Gln Leu Leu Ser Gln Glu Ala Leu Glu  
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Lys Val Asp Tyr Pro Gly Arg Arg Val Leu Thr Glu Leu Asn Ser Leu  
660 665 670

Ile Ser Arg Leu Ala Asp Asp Thr Lys Thr Tyr Lys Ala Glu Lys Ala  
675 680 685

Arg Gly Glu Leu Ala Ser Ser Ile Glu Cys Tyr Met Lys Asp His Pro  
690 695 700

Glu Cys Thr Glu Glu Ala Leu Asp His Ile Tyr Ser Ile Leu Glu  
705 710 715 720

Pro Ala Val Lys Glu Leu Thr Arg Glu Phe Leu Lys Pro Asp Asp Val  
725 730 735

Pro Phe Ala Cys Lys Lys Met Leu Phe Glu Glu Thr Arg Val Thr Met  
740 745 750

Val Ile Phe Lys Asp Gly Asp Gly Phe Gly Val Ser Lys Leu Glu Val  
755 760 765

Lys Asp His Ile Lys Glu Cys Leu Ile Glu Pro Leu Pro Leu  
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<213> *Abies grandis*

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tcgag						1865

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 <211> 581  
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 <213> Abies grandis

<400> 18

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Tyr Gly Ala Pro Ala Tyr Tyr Glu Leu Leu Gln Lys Leu Ile Gln Glu  
 35 40 45

Ile Lys His Leu Leu Leu Thr Glu Met Glu Met Asp Asp Gly Asp His  
 50 55 60

Asp Leu Ile Lys Arg Leu Gln Ile Val Asp Thr Leu Glu Cys Leu Gly  
65 70 75 80

Ile Asp Arg His Phe Glu His Glu Ile Gln Thr Ala Ala Leu Asp Tyr  
85 90 95

Val Tyr Arg Trp Trp Asn Glu Lys Gly Ile Gly Glu Gly Ser Arg Asp  
100 105 110

Ser Phe Ser Lys Asp Leu Asn Ala Thr Ala Leu Gly Phe Arg Ala Leu  
115 120 125

Arg Leu His Arg Tyr Asn Val Ser Ser Gly Val Leu Lys Asn Phe Lys  
130 135 140

Asp Glu Asn Gly Lys Phe Phe Cys Asn Phe Thr Gly Glu Glu Gly Arg  
145 150 155 160

Gly Asp Lys Gln Val Arg Ser Met Leu Ser Leu Leu Arg Ala Ser Glu  
165 170 175

Ile Ser Phe Pro Gly Glu Lys Val Met Glu Glu Ala Lys Ala Phe Thr  
180 185 190

Arg Glu Tyr Leu Asn Gln Val Leu Ala Gly His Gly Asp Val Thr Asp  
195 200 205

Val Asp Gln Ser Leu Leu Arg Glu Val Lys Tyr Ala Leu Glu Phe Pro  
210 215 220

Trp His Cys Ser Val Pro Arg Trp Glu Ala Arg Ser Phe Leu Glu Ile  
225 230 235 240

Tyr Gly His Asn His Ser Trp Leu Lys Ser Asn Ile Asn Gln Lys Met  
245 250 255

Leu Lys Leu Ala Lys Leu Asp Phe Asn Ile Leu Gln Cys Lys His His  
260 265 270

Lys Glu Ile Gln Phe Ile Thr Arg Trp Trp Arg Asp Ser Gly Ile Ser  
275 280 285

Gln Leu Asn Phe Tyr Arg Lys Arg His Val Glu Tyr Tyr Ser Trp Val  
290 295 300

Val Met Cys Ile Phe Glu Pro Glu Phe Ser Glu Ser Arg Ile Ala Phe  
305 310 315 320

Ala Lys Thr Ala Ile Leu Cys Thr Val Leu Asp Asp Leu Tyr Asp Thr  
325 330 335

His Ala Thr Leu His Glu Ile Lys Ile Met Thr Glu Gly Val Arg Arg  
340 345 350

Trp Asp Leu Ser Leu Thr Asp Asp Leu Pro Asp Tyr Ile Lys Ile Ala  
355 360 365

Phe Gln Phe Phe Asn Thr Val Asn Glu Leu Ile Val Glu Ile Val  
370 375 380

Lys Arg Gln Gly Arg Asp Met Thr Thr Ile Val Lys Asp Cys Trp Lys  
385 390 395 400

Arg Tyr Ile Glu Ser Tyr Leu Gln Glu Ala Glu Trp Ile Ala Thr Gly  
405 410 415

His Ile Pro Thr Phe Asn Glu Tyr Ile Lys Asn Gly Met Ala Ser Ser  
420 425 430

Gly Met Cys Ile Leu Asn Leu Asn Pro Leu Leu Leu Asp Lys Leu  
435 440 445

Leu Pro Asp Asn Ile Leu Glu Gln Ile His Ser Pro Ser Lys Ile Leu  
450 455 460

Asp Leu Leu Glu Leu Thr Gly Arg Ile Ala Asp Asp Leu Lys Asp Phe  
465 470 475 480

Glu Asp Glu Lys Glu Arg Gly Glu Met Ala Ser Ser Leu Gln Cys Tyr  
485 490 495

Met Lys Glu Asn Pro Glu Ser Thr Val Glu Asn Ala Leu Asn His Ile  
500 505 510

Lys Gly Ile Leu Asn Arg Ser Leu Glu Glu Phe Asn Trp Glu Phe Met  
515 520 525

Lys Gln Asp Ser Val Pro Met Cys Cys Lys Lys Phe Thr Phe Asn Ile  
530 535 540

Gly Arg Gly Leu Gln Phe Ile Tyr Lys Tyr Arg Asp Gly Leu Tyr Ile

545

550

555

560

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Val Pro Met Glu Glu  
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 <211> 1785  
 <212> DNA  
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 cacgtcgatg aaagcctttt gggagaggtg aagtacgcat tggagttcc atggcattgc 720  
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 caatgcacac atcagaaaga actgcagatt atctcaaggt gttcgcaga ctcaagtata 900  
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 acaatgctag atgacactgta cgatactcac ggaaccttgg accaactcaa aatctttaca 1080  
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aatggcacac caaacactgg gatgtgtgta ttgaatttga ttccgcttct gttaatggg 1380  
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ggggatttat cgtgtattga gtgttattta aaagatcatc ctgagtcac agtagaagat 1560  
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<210> 20  
<211> 593  
<212> PRT  
<213> *Abies grandis*

<400> 20

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Thr Glu Ser Ser Ile Thr Ser Asn Arg His Gly Asn Met Trp Glu Asp  
20 25 30

Asp Arg Ile Gln Ser Leu Asn Ser Pro Tyr Gly Ala Pro Ala Tyr Gln  
35 40 45

Glu Arg Ser Glu Lys Leu Ile Glu Glu Ile Lys Leu Leu Phe Leu Ser  
50 55 60

Asp Met Asp Asp Ser Cys Asn Asp Ser Asp Arg Asp Leu Ile Lys Arg  
65 70 75 80

Leu Glu Ile Val Asp Thr Val Glu Cys Leu Gly Ile Asp Arg His Phe  
85 90 95

Gln Pro Glu Ile Lys Leu Ala Leu Asp Tyr Val Tyr Arg Cys Trp Asn  
100 105 110

Glu Arg Gly Ile Gly Glu Gly Ser Arg Asp Ser Leu Lys Lys Asp Leu  
115 120 125

Asn Ala Thr Ala Leu Gly Phe Arg Ala Leu Arg Leu His Arg Tyr Asn  
130 135 140

Val Ser Ser Gly Val Leu Glu Asn Phe Arg Asp Asp Asn Gly Gln Phe

145

150

155

160

Phe Cys Gly Ser Thr Val Glu Glu Glu Gly Ala Glu Ala Tyr Asn Lys  
165 170 175

His Val Arg Cys Met Leu Ser Leu Ser Arg Ala Ser Asn Ile Leu Phe  
180 185 190

Pro Gly Glu Lys Val Met Glu Glu Ala Lys Ala Phe Thr Thr Asn Tyr  
195 200 205

Leu Lys Lys Val Leu Ala Gly Arg Glu Ala Thr His Val Asp Glu Ser  
210 215 220

Leu Leu Gly Glu Val Lys Tyr Ala Leu Glu Phe Pro Trp His Cys Ser  
225 230 235 240

Val Gln Arg Trp Glu Ala Arg Ser Phe Ile Glu Ile Phe Gly Gln Ile  
245 250 255

Asp Ser Glu Leu Lys Ser Asn Leu Ser Lys Lys Met Leu Glu Leu Ala  
260 265 270

Lys Leu Asp Phe Asn Ile Leu Gln Cys Thr His Gln Lys Glu Leu Gln  
275 280 285

Ile Ile Ser Arg Trp Phe Ala Asp Ser Ser Ile Ala Ser Leu Asn Phe  
290 295 300

Tyr Arg Lys Cys Tyr Val Glu Phe Tyr Phe Trp Met Ala Ala Ala Ile  
305 310 315 320

Ser Glu Pro Glu Phe Ser Gly Ser Arg Val Ala Phe Thr Lys Ile Ala  
325 330 335

Ile Leu Met Thr Met Leu Asp Asp Leu Tyr Asp Thr His Gly Thr Leu  
340 345 350

Asp Gln Leu Lys Ile Phe Thr Glu Gly Val Arg Arg Trp Asp Val Ser  
355 360 365

Leu Val Glu Gly Leu Pro Asp Phe Met Lys Ile Ala Phe Glu Phe Trp  
370 375 380

Leu Lys Thr Ser Asn Glu Leu Ile Ala Glu Ala Val Lys Ala Gln Gly  
385 390 395 400

Gln Asp Met Ala Ala Tyr Ile Arg Lys Asn Ala Trp Glu Arg Tyr Leu  
405 410 415

Glu Ala Tyr Leu Gln Asp Ala Glu Trp Ile Ala Thr Gly His Val Pro  
420 425 430

Thr Phe Asp Glu Tyr Leu Asn Asn Gly Thr Pro Asn Thr Gly Met Cys  
435 440 445

Val Leu Asn Leu Ile Pro Leu Leu Leu Met Gly Glu His Leu Pro Ile  
450 455 460

Asp Ile Leu Glu Gln Ile Phe Leu Pro Ser Arg Phe His His Leu Ile  
465 470 475 480

Glu Leu Ala Ser Arg Leu Val Asp Asp Ala Arg Asp Phe Gln Ala Glu  
485 490 495

Lys Asp His Gly Asp Leu Ser Cys Ile Glu Cys Tyr Leu Lys Asp His  
500 505 510

Pro Glu Ser Thr Val Glu Asp Ala Leu Asn His Val Asn Gly Leu Leu  
515 520 525

Gly Asn Cys Leu Leu Glu Met Asn Trp Lys Phe Leu Lys Lys Gln Asp  
530 535 540

Ser Val Pro Leu Ser Cys Lys Lys Tyr Ser Phe His Val Leu Ala Arg  
545 550 555 560

Ser Ile Gln Phe Met Tyr Asn Gln Gly Asp Gly Phe Ser Ile Ser Asn  
565 570 575

Lys Val Ile Lys Asp Gln Val Gln Lys Val Leu Ile Val Pro Val Pro  
580 585 590

Ile

<210> 21  
<211> 2018  
<212> DNA  
<213> *Abies grandis*

<400> 21  
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atgatggtgt acgaagacgc atggcgatt tccattccaa cctctggac gatgatgtca 240  
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tcgggaaagt aaagaacatg ttcaattcga tgtcattaga agatggagag ttaatgagtc 360  
cgctcaatga tctcattcaa cgccTTGGA ttgtcgacag ccttgaacgt ttgggatcc 420  
atagacattt caaagatgag ataaaatcgg cgcttgatta tgTTTACAGT tattggggcg 480  
aaaatggcat cgatgcggg agggagagtg ttgttactga tctgaactca actgcgttgg 540  
ggcttcgaac cctacgacta cacggatacc cggtgtcttc agatgtttc aaagcttca 600  
aaggccaaaa tggcagttt tcctgctctg aaaatattca gacagatgaa gagatcagag 660  
gcgttctgaa tttattccgg gcctccctca ttgccttcc aggggagaaa attatggatg 720  
aggctgaaat cttctctacc aaatattta aagaagccct gcaaaagatt ccggctcaca 780  
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tgaagcaag gaattacatc caagtcttg gacaggacac tgagaacacg aagtcatatg 900  
tgaagagcaa aaaacttttta gaactcgcaa aattggagtt caacatctt caatccttac 960  
aaaagagggg gttagaaagt ctggtcagat ggtggaaaga atcgggTTT cctgagatga 1020  
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agagatgggaa tccgtcctcg atagattgcc ttccagaata tatgaaagga gtgtacatag 1260  
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gctgtggta tcgcataatcc gcattgcaac ccattctgac aatggacatc cccttcctg 1500  
atcatatcct caaggaagtt gacttccat caaagcttaa cgacttggca tgtgccatcc 1560  
ttcgattacg aggtgatacg cggtgctaca aggcggacag ggctcggtga gaagaagctt 1620  
cctctataatc atgttatatg aaagacaatc ctggagtatc agaggaagat gctctcgatc 1680  
atatcaacgc catgatcagt gacgtaatca aaggattaaa ttggaaactt ctcaaaccag 1740  
acatcaatgt tcccatctcg gcgaaagaaac atgctttga catcgccaga gcttccatt 1800  
acggctacaa ataccgagac ggctacagcg ttgccaacgt tgaaacgaag agtttggta 1860

cgagaaccct ccttgaatct gtgcctttgt agcaacagct caaatctatg ccctatgcta 1920  
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ttaataaaag ttgttaattta aaaaaaaaaa aaaaaaaaa 2018

<210> 22  
<211> 628  
<212> PRT  
<213> *Abies grandis*

<400> 22

Met Ala Leu Val Ser Thr Ala Pro Leu Ala Ser Lys Ser Cys Leu His  
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Lys Ser Leu Ile Ser Ser Thr His Glu Leu Lys Ala Leu Ser Arg Thr  
20 25 30

Ile Pro Ala Leu Gly Met Ser Arg Arg Gly Lys Ser Ile Thr Pro Ser  
35 40 45

Ile Ser Met Ser Ser Thr Thr Val Val Thr Asp Asp Gly Val Arg Arg  
50 55 60

Arg Met Gly Asp Phe His Ser Asn Leu Trp Asp Asp Asp Val Ile Gln  
65 70 75 80

Ser Leu Pro Thr Ala Tyr Glu Glu Lys Ser Tyr Leu Glu Arg Ala Glu  
85 90 95

Lys Leu Ile Gly Glu Val Lys Asn Met Phe Asn Ser Met Ser Leu Glu  
100 105 110

Asp Gly Glu Leu Met Ser Pro Leu Asn Asp Leu Ile Gln Arg Leu Trp  
115 120 125

Ile Val Asp Ser Leu Glu Arg Leu Gly Ile His Arg His Phe Lys Asp  
130 135 140

Glu Ile Lys Ser Ala Leu Asp Tyr Val Tyr Ser Tyr Trp Gly Glu Asn  
145 150 155 160

Gly Ile Gly Cys Gly Arg Glu Ser Val Val Thr Asp Leu Asn Ser Thr  
165 170 175

Ala Leu Gly Leu Arg Thr Leu Arg Leu His Gly Tyr Pro Val Ser Ser  
180 185 190

Asp Val Phe Lys Ala Phe Lys Gly Gln Asn Gly Gln Phe Ser Cys Ser  
195 200 205

Glu Asn Ile Gln Thr Asp Glu Glu Ile Arg Gly Val Leu Asn Leu Phe  
210 215 220

Arg Ala Ser Leu Ile Ala Phe Pro Gly Glu Lys Ile Met Asp Glu Ala  
225 230 235 240

Glu Ile Phe Ser Thr Lys Tyr Leu Lys Glu Ala Leu Gln Lys Ile Pro  
245 250 255

Val Ser Ser Leu Ser Arg Glu Ile Gly Asp Val Leu Glu Tyr Gly Trp  
260 265 270

His Thr Tyr Leu Pro Arg Leu Glu Ala Arg Asn Tyr Ile Gln Val Phe  
275 280 285

Gly Gln Asp Thr Glu Asn Thr Lys Ser Tyr Val Lys Ser Lys Lys Leu  
290 295 300

Leu Glu Leu Ala Lys Leu Glu Phe Asn Ile Phe Gln Ser Leu Gln Lys  
305 310 315 320

Arg Glu Leu Glu Ser Leu Val Arg Trp Trp Lys Glu Ser Gly Phe Pro  
325 330 335

Glu Met Thr Phe Cys Arg His Arg His Val Glu Tyr Tyr Thr Leu Ala  
340 345 350

Ser Cys Ile Ala Phe Glu Pro Gln His Ser Gly Phe Arg Leu Gly Phe  
355 360 365

Ala Lys Thr Cys His Leu Ile Thr Val Leu Asp Asp Met Tyr Asp Thr  
370 375 380

Phe Gly Thr Val Asp Glu Leu Glu Leu Phe Thr Ala Thr Met Lys Arg  
385 390 395 400

Trp Asp Pro Ser Ser Ile Asp Cys Leu Pro Glu Tyr Met Lys Gly Val  
405 410 415

Tyr Ile Ala Val Tyr Asp Thr Val Asn Glu Met Ala Arg Glu Ala Glu  
420 425 430

Glu Ala Gln Gly Arg Asp Thr Leu Thr Tyr Ala Arg Glu Ala Trp Glu  
435 440 445

Ala Tyr Ile Asp Ser Tyr Met Gln Glu Ala Arg Trp Ile Ala Thr Gly  
450 455 460

Tyr Leu Pro Ser Phe Asp Glu Tyr Tyr Glu Asn Gly Lys Val Ser Cys  
465 470 475 480

Gly His Arg Ile Ser Ala Leu Gln Pro Ile Leu Thr Met Asp Ile Pro  
485 490 495

Phe Pro Asp His Ile Leu Lys Glu Val Asp Phe Pro Ser Lys Leu Asn  
500 505 510

Asp Leu Ala Cys Ala Ile Leu Arg Leu Arg Gly Asp Thr Arg Cys Tyr  
515 520 525

Lys Ala Asp Arg Ala Arg Gly Glu Glu Ala Ser Ser Ile Ser Cys Tyr  
530 535 540

Met Lys Asp Asn Pro Gly Val Ser Glu Glu Asp Ala Leu Asp His Ile  
545 550 555 560

Asn Ala Met Ile Ser Asp Val Ile Lys Gly Leu Asn Trp Glu Leu Leu  
565 570 575

Lys Pro Asp Ile Asn Val Pro Ile Ser Ala Lys Lys His Ala Phe Asp  
580 585 590

Ile Ala Arg Ala Phe His Tyr Gly Tyr Lys Tyr Arg Asp Gly Tyr Ser  
595 600 605

Val Ala Asn Val Glu Thr Lys Ser Leu Val Thr Arg Thr Leu Leu Glu  
610 615 620

Ser Val Pro Leu  
625

<210> 23  
<211> 2089  
<212> DNA  
<213> Abies grandis

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ctgaaatcg	tgatcagttc	cagcaatgtg	cagaaggctc	tctgtatctc	tacagcagtc	180
ccaacactca	aatgcgtag	gcgacagaaaa	gctctggtca	tcaacatgaa	attgaccact	240
gtatccatc	gtgatgataa	tggtggtgg	gtactgaaa	gacgcatagc	cgatcatcat	300
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aataatagag	aattatgg	ttccaaaat	gatctcctta	cacgccttg	gatggtggat	480
agcattgaac	gtctggggat	agatagacat	ttccaaaatg	agataagagt	agccctcgat	540
tatgttaca	gttattggaa	ggaaaaggaa	ggcattgggt	gtggcagaga	ttctacttt	600
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gcaaaattgg	agttcaatat	cttcactct	ttgcaactaa	gagagttaca	atctatctcc	1080
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acgtttgagg	agtacttgaa	gaatgcaaaa	gttagttctg	gttctcgcat	agccacatta	1560
caacccattc	tcactttgga	tgtaccactt	cctgattaca	tactgcaaga	aattgattat	1620
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catcctggat	caatagagga	agatgctctc	aatcatatca	acgcccattat	cagtgtatgc	1800
atcagagaat	taaattggaa	gcttctcaga	ccggatagca	aaagtcccat	ctcttccaag	1860
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actgtttcca acaacgaaac aaagaatttg gtgatgaaaa ccgttcttga acctctcgct 1980  
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tctttcataa tgtagatctg gatgtgtatt gaactctaaa aaaaaaaaaa 2089

<210> 24  
<211> 637  
<212> PRT  
<213> *Abies grandis*

<400> 24

Met Ala Leu Leu Ser Ile Val Ser Leu Gln Val Pro Lys Ser Cys Gly  
1 5 10 15

Leu Lys Ser Leu Ile Ser Ser Asn Val Gln Lys Ala Leu Cys Ile  
20 25 30

Ser Thr Ala Val Pro Thr Leu Arg Met Arg Arg Arg Gln Lys Ala Leu  
35 40 45

Val Ile Asn Met Lys Leu Thr Thr Val Ser His Arg Asp Asp Asn Gly  
50 55 60

Gly Gly Val Leu Gln Arg Arg Ile Ala Asp His His Pro Asn Leu Trp  
65 70 75 80

Glu Asp Asp Phe Ile Gln Ser Leu Ser Ser Pro Tyr Gly Gly Ser Ser  
85 90 95

Tyr Ser Glu Arg Ala Glu Thr Val Val Glu Glu Val Lys Glu Met Phe  
100 105 110

Asn Ser Ile Pro Asn Asn Arg Glu Leu Phe Gly Ser Gln Asn Asp Leu  
115 120 125

Leu Thr Arg Leu Trp Met Val Asp Ser Ile Glu Arg Leu Gly Ile Asp  
130 135 140

Arg His Phe Gln Asn Glu Ile Arg Val Ala Leu Asp Tyr Val Tyr Ser  
145 150 155 160

Tyr Trp Lys Glu Lys Glu Gly Ile Gly Cys Gly Arg Asp Ser Thr Phe  
165 170 175

Pro Asp Leu Asn Ser Thr Ala Leu Ala Leu Arg Thr Leu Arg Leu His  
180 185 190

Gly Tyr Asn Val Ser Ser Asp Val Leu Glu Tyr Phe Lys Asp Glu Lys  
195 200 205

Gly His Phe Ala Cys Pro Ala Ile Leu Thr Glu Gly Gln Ile Thr Arg  
210 215 220

Ser Val Leu Asn Leu Tyr Arg Ala Ser Leu Val Ala Phe Pro Gly Glu  
225 230 235 240

Lys Val Met Glu Glu Ala Glu Ile Phe Ser Ala Ser Tyr Leu Lys Lys  
245 250 255

Val Leu Gln Lys Ile Pro Val Ser Asn Leu Ser Gly Glu Ile Glu Tyr  
260 265 270

Val Leu Glu Tyr Gly Trp His Thr Asn Leu Pro Arg Leu Glu Ala Arg  
275 280 285

Asn Tyr Ile Glu Val Tyr Glu Gln Ser Gly Tyr Glu Ser Leu Asn Glu  
290 295 300

Met Pro Tyr Met Asn Met Lys Lys Leu Leu Gln Leu Ala Lys Leu Glu  
305 310 315 320

Phe Asn Ile Phe His Ser Leu Gln Leu Arg Glu Leu Gln Ser Ile Ser  
325 330 335

Arg Trp Trp Lys Glu Ser Gly Ser Ser Gln Leu Thr Phe Thr Arg His  
340 345 350

Arg His Val Glu Tyr Tyr Thr Met Ala Ser Cys Ile Ser Met Leu Pro  
355 360 365

Lys His Ser Ala Phe Arg Met Glu Phe Val Lys Val Cys His Leu Val  
370 375 380

Thr Val Leu Asp Asp Ile Tyr Asp Thr Phe Gly Thr Met Asn Glu Leu  
385 390 395 400

Gln Leu Phe Thr Asp Ala Ile Lys Arg Trp Asp Leu Ser Thr Thr Arg  
405 410 415

Trp Leu Pro Glu Tyr Met Lys Gly Val Tyr Met Asp Leu Tyr Gln Cys  
420 425 430

Ile Asn Glu Met Val Glu Glu Ala Glu Lys Thr Gln Gly Arg Asp Met  
435 440 445

Leu Asn Tyr Ile Gln Asn Ala Trp Glu Ala Leu Phe Asp Thr Phe Met  
450 455 460

Gln Glu Ala Lys Trp Ile Ser Ser Ser Tyr Leu Pro Thr Phe Glu Glu  
465 470 475 480

Tyr Leu Lys Asn Ala Lys Val Ser Ser Gly Ser Arg Ile Ala Thr Leu  
485 490 495

Gln Pro Ile Leu Thr Leu Asp Val Pro Leu Pro Asp Tyr Ile Leu Gln  
500 505 510

Glu Ile Asp Tyr Pro Ser Arg Phe Asn Glu Leu Ala Ser Ser Ile Leu  
515 520 525

Arg Leu Arg Gly Asp Thr Arg Cys Tyr Lys Ala Asp Arg Ala Arg Gly  
530 535 540

Glu Glu Ala Ser Ala Ile Ser Cys Tyr Met Lys Asp His Pro Gly Ser  
545 550 555 560

Ile Glu Glu Asp Ala Leu Asn His Ile Asn Ala Met Ile Ser Asp Ala  
565 570 575

Ile Arg Glu Leu Asn Trp Glu Leu Leu Arg Pro Asp Ser Lys Ser Pro  
580 585 590

Ile Ser Ser Lys Lys His Ala Phe Asp Ile Thr Arg Ala Phe His His  
595 600 605

Val Tyr Lys Tyr Arg Asp Gly Tyr Thr Val Ser Asn Asn Glu Thr Lys  
610 615 620

Asn Leu Val Met Lys Thr Val Leu Glu Pro Leu Ala Leu  
625 630 635

<210> 25  
<211> 2196  
<212> DNA  
<213> Abies grandis

<400> 25  
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gagcaagaat ggctctgggtt tctatctcac cgttggcttc gaaatcttgc ctgcgcaagt 120



tggaaacact ccttgaatct atgcttttt aactataacc atatccataa taataagctc 1980  
ataatgctaa attattggcc ttatgacata gtttatgtat gtacttgtgt gaattcaatc 2040  
atatcggtgtg ggtatgatta aaaagctaga gcttaactagg ttagtaacat ggtgataaaa 2100  
gttataaaat gtgagttata gagataccca tggtaataa tgaattacaa aaagagaaaat 2160  
ttatgtagaa taagattgga agctttcaa ttgttt 2196

<210> 26  
<211> 627  
<212> PRT  
<213> *Abies grandis*

<400> 26

Met Ala Leu Val Ser Ile Ser Pro Leu Ala Ser Lys Ser Cys Leu Arg  
1 5 10 15

Lys Ser Leu Ile Ser Ser Ile His Glu His Lys Pro Pro Tyr Arg Thr  
20 25 30

Ile Pro Asn Leu Gly Met Arg Arg Arg Gly Lys Ser Val Thr Pro Ser  
35 40 45

Met Ser Ile Ser Leu Ala Thr Ala Ala Pro Asp Asp Gly Val Gln Arg  
50 55 60

Arg Ile Gly Asp Tyr His Ser Asn Ile Trp Asp Asp Asp Phe Ile Gln  
65 70 75 80

Ser Leu Ser Thr Pro Tyr Gly Glu Pro Ser Tyr Gln Glu Arg Ala Glu  
85 90 95

Arg Leu Ile Val Glu Val Lys Ile Phe Asn Ser Met Tyr Leu Asp  
100 105 110

Asp Gly Arg Leu Met Ser Ser Phe Asn Asp Leu Met Gln Arg Leu Trp  
115 120 125

Ile Val Asp Ser Val Glu Arg Leu Gly Ile Ala Arg His Phe Lys Asn  
130 135 140

Glu Ile Thr Ser Ala Leu Asp Tyr Val Phe Arg Tyr Trp Glu Glu Asn  
145 150 155 160

Gly Ile Gly Cys Gly Arg Asp Ser Ile Val Thr Asp Leu Asn Ser Thr  
165 170 175

Ala Leu Gly Phe Arg Thr Leu Arg Leu His Gly Tyr Thr Val Ser Pro  
180 185 190

Glu Val Leu Lys Ala Phe Gln Asp Gln Asn Gly Gln Phe Val Cys Ser  
195 200 205

Pro Gly Gln Thr Glu Gly Glu Ile Arg Ser Val Leu Asn Leu Tyr Arg  
210 215 220

Ala Ser Leu Ile Ala Phe Pro Gly Glu Lys Val Met Glu Glu Ala Glu  
225 230 235 240

Ile Phe Ser Thr Arg Tyr Leu Lys Glu Ala Leu Gln Lys Ile Pro Val  
245 250 255

Ser Ala Leu Ser Gln Glu Ile Lys Phe Val Met Glu Tyr Gly Trp His  
260 265 270

Thr Asn Leu Pro Arg Leu Glu Ala Arg Asn Tyr Ile Asp Thr Leu Glu  
275 280 285

Lys Asp Thr Ser Ala Trp Leu Asn Lys Asn Ala Gly Lys Lys Leu Leu  
290 295 300

Glu Leu Ala Lys Leu Glu Phe Asn Ile Phe Asn Ser Leu Gln Gln Lys  
305 310 315 320

Glu Leu Gln Tyr Leu Leu Arg Trp Trp Lys Glu Ser Asp Leu Pro Lys  
325 330 335

Leu Thr Phe Ala Arg His Arg His Val Glu Phe Tyr Thr Leu Ala Ser  
340 345 350

Cys Ile Ala Ile Asp Pro Lys His Ser Ala Phe Arg Leu Gly Phe Ala  
355 360 365

Lys Met Cys His Leu Val Thr Val Leu Asp Asp Ile Tyr Asp Thr Phe  
370 375 380

Gly Thr Ile Asp Glu Leu Glu Leu Phe Thr Ser Ala Ile Lys Arg Trp  
385 390 395 400

Asn Ser Ser Glu Ile Glu His Leu Pro Glu Tyr Met Lys Cys Val Tyr  
405 410 415

Met Val Val Phe Glu Thr Val Asn Glu Leu Thr Arg Glu Ala Glu Lys  
420 425 430

Thr Gln Gly Arg Asn Thr Leu Asn Tyr Val Arg Lys Ala Trp Glu Ala  
435 440 445

Tyr Phe Asp Ser Tyr Met Glu Glu Ala Lys Trp Ile Ser Asn Gly Tyr  
450 455 460

Leu Pro Met Phe Glu Glu Tyr His Glu Asn Gly Lys Val Ser Ser Ala  
465 470 475 480

Tyr Arg Val Ala Thr Leu Gln Pro Ile Leu Thr Leu Asn Ala Trp Leu  
485 490 495

Pro Asp Tyr Ile Leu Lys Gly Ile Asp Phe Pro Ser Arg Phe Asn Asp  
500 505 510

Leu Ala Ser Ser Phe Leu Arg Leu Arg Gly Asp Thr Arg Cys Tyr Lys  
515 520 525

Ala Asp Arg Asp Arg Gly Glu Glu Ala Ser Cys Ile Ser Cys Tyr Met  
530 535 540

Lys Asp Asn Pro Gly Ser Thr Glu Glu Asp Ala Leu Asn His Ile Asn  
545 550 555 560

Ala Met Val Asn Asp Ile Ile Lys Glu Leu Asn Trp Glu Leu Leu Arg  
565 570 575

Ser Asn Asp Asn Ile Pro Met Leu Ala Lys Lys His Ala Phe Asp Ile  
580 585 590

Thr Arg Ala Leu His His Leu Tyr Ile Tyr Arg Asp Gly Phe Ser Val  
595 600 605

Ala Asn Lys Glu Thr Lys Lys Leu Val Met Glu Thr Leu Leu Glu Ser  
610 615 620

Met Leu Phe  
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<210> 27  
<211> 2429  
<212> DNA  
<213> Abies grandis

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 tctctgtatc tctacagcag tcccaactct cagaatgcgt aggcgcacaga aagctctgg 120  
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 ctcacccat ggggatctt cgtacagtga acgtgctgtg acagtgggtg aggaagtaaa  
 agagatgttc aattcaatac caaataatag agaatttattt gttccaaa atgatctcct 240  
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 tgagataaga gtagccctcg attatgttta cagttattgg aaggaaaagg aaggcattgg 480  
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<210> 28  
 <211> 637  
 <212> PRT  
 <213> *Abies grandis*

<400> 28

Met Ala Leu Leu Ser Ile Val Ser Leu Gln Val Pro Lys Ser Cys Gly  
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Leu Lys Ser Leu Ile Ser Ser Ser Asn Val Gln Lys Ala Leu Cys Ile  
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Ser Thr Ala Val Pro Thr Leu Arg Met Arg Arg Arg Gln Lys Ala Leu  
 35 40 45

Val Ile Asn Met Lys Leu Thr Thr Val Ser His Arg Asp Asp Asn Gly  
 50 55 60

Gly Gly Val Leu Gln Arg Arg Ile Ala Asp His His Pro Asn Leu Trp  
 65 70 75 80

Glu Asp Asp Phe Ile Gln Ser Leu Ser Ser Pro Tyr Gly Gly Ser Ser  
 85 90 95

Tyr Ser Glu Arg Ala Val Thr Val Val Glu Glu Val Lys Glu Met Phe  
 100 105 110

Asn Ser Ile Pro Asn Asn Arg Glu Leu Phe Gly Ser Gln Asn Asp Leu  
 115 120 125

Leu Thr Arg Leu Trp Met Val Asp Ser Ile Glu Arg Leu Gly Ile Asp  
130 135 140

Arg His Phe Gln Asn Glu Ile Arg Val Ala Leu Asp Tyr Val Tyr Ser  
145 150 155 160

Tyr Trp Lys Glu Lys Glu Gly Ile Gly Cys Gly Arg Asp Ser Thr Phe  
165 170 175

Pro Asp Leu Asn Ser Thr Ala Leu Ala Leu Arg Thr Leu Arg Leu His  
180 185 190

Gly Tyr Asn Val Ser Ser Asp Val Leu Glu Tyr Phe Lys Asp Gln Lys  
195 200 205

Gly His Phe Ala Cys Pro Ala Ile Leu Thr Glu Gly Gln Ile Thr Arg  
210 215 220

Ser Val Leu Asn Leu Tyr Arg Ala Ser Leu Val Ala Phe Pro Gly Glu  
225 230 235 240

Lys Val Met Glu Glu Ala Glu Ile Phe Ser Ala Ser Tyr Leu Lys Glu  
245 250 255

Val Leu Gln Lys Ile Pro Val Ser Ser Phe Ser Arg Glu Ile Glu Tyr  
260 265 270

Val Leu Glu Tyr Gly Trp His Thr Asn Leu Pro Arg Leu Glu Ala Arg  
275 280 285

Asn Tyr Ile Asp Val Tyr Gly Gln Asp Ser Tyr Glu Ser Ser Asn Glu  
290 295 300

Met Pro Tyr Val Asn Thr Gln Lys Leu Leu Lys Leu Ala Lys Leu Glu  
305 310 315 320

Phe Asn Ile Phe His Ser Leu Gln Gln Lys Glu Leu Gln Tyr Ile Ser  
325 330 335

Arg Trp Trp Lys Asp Ser Cys Ser Ser His Leu Thr Phe Thr Arg His  
340 345 350

Arg His Val Glu Tyr Tyr Thr Met Ala Ser Cys Ile Ser Met Glu Pro  
355 360 365

Lys His Ser Ala Phe Arg Leu Gly Phe Val Lys Thr Cys His Leu Leu  
370 375 380 385

Thr Val Leu Asp Asp Met Tyr Asp Thr Phe Gly Thr Leu Asp Glu Leu  
385 390 395 400

Gln Leu Phe Thr Thr Ala Phe Lys Arg Trp Asp Leu Ser Glu Thr Lys  
405 410 415

Cys Leu Pro Glu Tyr Met Lys Ala Val Tyr Met Asp Leu Tyr Gln Cys  
420 425 430

Leu Asn Glu Leu Ala Gln Glu Ala Glu Lys Thr Gln Gly Arg Asp Thr  
435 440 445

Leu Asn Tyr Ile Arg Asn Ala Tyr Glu Ser His Phe Asp Ser Phe Met  
450 455 460

His Glu Ala Lys Trp Ile Ser Ser Gly Tyr Leu Pro Thr Phe Glu Glu  
465 470 475 480

Tyr Leu Lys Asn Gly Lys Val Ser Ser Gly Ser Arg Thr Ala Thr Leu  
485 490 495

Gln Pro Ile Leu Thr Leu Asp Val Pro Leu Pro Asn Tyr Ile Leu Gln  
500 505 510

Glu Ile Asp Tyr Pro Ser Arg Phe Asn Asp Leu Ala Ser Ser Leu Leu  
515 520 525

Arg Leu Arg Gly Asp Thr Arg Cys Tyr Lys Ala Asp Arg Ala Arg Gly  
530 535 540

Glu Glu Ala Ser Ala Ile Ser Cys Tyr Met Lys Asp His Pro Gly Ser  
545 550 555 560

Thr Glu Glu Asp Ala Leu Asn His Ile Asn Val Met Ile Ser Asp Ala  
565 570 575

Ile Arg Glu Leu Asn Trp Glu Leu Leu Arg Pro Asp Ser Lys Ser Pro  
580 585 590

Ile Ser Ser Lys Lys His Ala Phe Asp Ile Thr Arg Ala Phe His His  
595 600 605

Leu Tyr Lys Tyr Arg Asp Gly Tyr Thr Val Ala Ser Ser Glu Thr Lys

610

615

620

Asn Leu Val Met Lys Thr Val Leu Glu Pro Val Ala Leu  
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<212> DNA  
<213> Artificial Sequence

<220>  
<223> Primer

<220>  
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<222> (1)..(20)  
<223> n equals unknown

<400> 29  
gcntaygaya cngcntgggt 20

<210> 30  
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<212> DNA  
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<220>  
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<223> n equals unknown

<400> 30  
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<210> 31  
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<223> Primer

<400> 31  
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<210> 32  
<211> 2622  
<212> DNA  
<213> Ginkgo biloba

<400> 32

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<210> 33  
 <211> 873  
 <212> PRT  
 <213> Ginkgo biloba

<400> 33

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Pro Lys Val Pro Phe Arg Gln Ser Thr Asn Ile Leu Ile Pro Phe His	
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30	

Lys Arg Ser Ser Phe Gly Phe Asn Ala Gln His Cys Val Arg Ser His	
35	40
45	

Leu Arg Leu Arg Trp Asn Cys Val Gly Ile His Ala Ser Ala Ala Glu	
50	55
60	

Thr Arg Pro Asp Gln Leu Pro Gln Glu Glu Arg Phe Val Ser Arg Leu	
65	70
75	80

Asn Ala Asp Tyr His Pro Ala Val Trp Lys Asp Asp Phe Ile Asp Ser	
85	90
95	

Leu Thr Ser Pro Asn Ser His Ala Thr Ser Lys Ser Ser Val Asp Glu	
100	105
110	

Thr Ile Asn Lys Arg Ile Gln Thr Leu Val Lys Glu Ile Gln Cys Met  
115 120 125

Phe Gln Ser Met Gly Asp Gly Glu Thr Asn Pro Ser Ala Tyr Asp Thr  
130 135 140

Ala Trp Val Ala Arg Ile Pro Ser Ile Asp Gly Ser Gly Ala Pro Gln  
145 150 155 160

Phe Pro Gln Thr Leu Gln Trp Ile Leu Asn Asn Gln Leu Pro Asp Gly  
165 170 175

Ser Trp Gly Glu Glu Cys Ile Phe Leu Ala Tyr Asp Arg Val Leu Asn  
180 185 190

Thr Leu Ala Cys Leu Leu Thr Leu Lys Ile Trp Asn Lys Gly Asp Ile  
195 200 205

Gln Val Gln Lys Gly Val Glu Phe Val Arg Lys His Met Glu Glu Met  
210 215 220

Lys Asp Glu Ala Asp Asn His Arg Pro Ser Gly Phe Glu Val Val Phe  
225 230 235 240

Pro Ala Met Leu Asp Glu Ala Lys Ser Leu Gly Leu Asp Leu Pro Tyr  
245 250 255

His Leu Pro Phe Ile Ser Gln Ile His Gln Lys Arg Gln Lys Lys Leu  
260 265 270

Gln Lys Ile Pro Leu Asn Val Leu His Asn His Gln Thr Ala Leu Leu  
275 280 285

Tyr Ser Leu Glu Gly Leu Gln Asp Val Val Asp Trp Gln Glu Ile Thr  
290 295 300

Asn Leu Gln Ser Arg Asp Gly Ser Phe Leu Ser Ser Pro Ala Ser Thr  
305 310 315 320

Ala Cys Val Phe Met His Thr Gln Asn Lys Arg Cys Leu His Phe Leu  
325 330 335

Asn Phe Val Leu Ser Lys Phe Gly Asp Tyr Val Pro Cys His Tyr Pro  
340 345 350

Leu Asp Leu Phe Glu Arg Leu Trp Ala Val Asp Thr Val Glu Arg Leu  
355 360 365

Gly Ile Asp Arg Tyr Phe Lys Lys Glu Ile Lys Glu Ser Leu Asp Tyr  
370 375 380

Val Tyr Arg Tyr Trp Asp Ala Glu Arg Gly Val Gly Trp Ala Arg Cys  
385 390 395 400

Asn Pro Ile Pro Asp Val Asp Asp Thr Ala Met Gly Leu Arg Ile Leu  
405 410 415

Arg Leu His Gly Tyr Asn Val Ser Ser Asp Val Leu Glu Asn Phe Arg  
420 425 430

Asp Glu Lys Gly Asp Phe Phe Cys Phe Ala Gly Gln Thr Gln Ile Gly  
435 440 445

Val Thr Asp Asn Leu Asn Leu Tyr Arg Cys Ser Gln Val Cys Phe Pro  
450 455 460

Gly Glu Lys Ile Met Glu Glu Ala Lys Thr Phe Thr Thr Asn His Leu  
465 470 475 480

Gln Asn Ala Leu Ala Lys Asn Asn Ala Phe Asp Lys Trp Ala Val Lys  
485 490 495

Lys Asp Leu Pro Gly Glu Val Glu Tyr Ala Ile Lys Tyr Pro Trp His  
500 505 510

Arg Ser Met Pro Arg Leu Glu Ala Arg Ser Tyr Ile Glu Gln Phe Gly  
515 520 525

Ser Asn Asp Val Trp Leu Gly Lys Thr Val Tyr Lys Met Leu Tyr Val  
530 535 540

Ser Asn Glu Lys Tyr Leu Glu Leu Ala Lys Leu Asp Phe Asn Met Val  
545 550 555 560

Gln Ala Leu His Gln Lys Glu Thr Gln His Ile Val Ser Trp Trp Arg  
565 570 575

Glu Ser Gly Phe Asn Asp Leu Thr Phe Thr Arg Gln Arg Pro Val Glu  
580 585 590

Met Tyr Phe Ser Val Ala Val Ser Met Phe Glu Pro Glu Phe Ala Ala  
595 600 605

Cys Arg Ile Ala Tyr Ala Lys Thr Ser Cys Leu Ala Val Ile Leu Asp  
610 615 620

Asp Leu Tyr Asp Thr His Gly Ser Leu Asp Asp Leu Lys Leu Phe Ser  
625 630 635 640

Glu Ala Val Arg Arg Trp Asp Ile Ser Val Leu Asp Ser Val Arg Asp  
645 650 655

Asn Gln Leu Lys Val Cys Phe Leu Gly Leu Tyr Asn Thr Val Asn Gly  
660 665 670

Phe Gly Lys Asp Gly Leu Lys Glu Gln Gly Arg Asp Val Leu Gly Tyr  
675 680 685

Leu Arg Lys Val Trp Glu Gly Leu Leu Ala Ser Tyr Thr Lys Glu Ala  
690 695 700

Glu Trp Ser Ala Ala Lys Tyr Val Pro Thr Phe Asn Glu Tyr Val Glu  
705 710 715 720

Asn Ala Lys Val Ser Ile Ala Leu Ala Thr Val Val Leu Asn Ser Ile  
725 730 735

Phe Phe Thr Gly Glu Leu Leu Pro Asp Tyr Ile Leu Gln Gln Val Asp  
740 745 750

Leu Arg Ser Lys Phe Leu His Leu Val Ser Leu Thr Gly Arg Leu Ile  
755 760 765

Asn Asp Thr Lys Thr Tyr Gln Ala Glu Arg Asn Arg Gly Glu Leu Val  
770 775 780

Ser Ser Val Gln Cys Tyr Met Arg Glu Asn Pro Glu Cys Thr Glu Glu  
785 790 795 800

Glu Ala Leu Ser His Val Tyr Gly Ile Ile Asp Asn Ala Leu Lys Glu  
805 810 815

Leu Asn Trp Glu Leu Ala Asn Pro Ala Ser Asn Ala Pro Leu Cys Val  
820 825 830

Arg Arg Leu Leu Phe Asn Thr Ala Arg Val Met Gln Leu Phe Tyr Met

835

840

845

Tyr Arg Asp Gly Phe Gly Ile Ser Asp Lys Glu Met Lys Asp His Val  
 850 855 860

Ser Arg Thr Leu Phe Asp Pro Val Ala  
 865 870

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 <211> 2445  
 <212> DNA  
 <213> Ginkgo biloba

<400> 34		
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cttgtgtctt	tgactggacg	actaatcaat	gacaccaaga	cttaccaggc	cgagagaaac	2160
cgtggtaat	tggttccag	cgtacagtgc	tacatgaggg	aaaatccgga	gtgcacagag	2220
gaagaagctc	taagtcatgt	ttatggtatc	atcgacaacg	cactgaagga	attgaattgg	2280
gagttggcca	acccagcgag	caatgccccca	ttgtgtgtga	gaagactgct	gttcaacact	2340
gcaagagtga	tgcagctgtt	ttatatgtac	agagatggct	ttggtatctc	tgacaaagag	2400
atgaaaagacc	atgtcagccg	aactctttc	gatcctgtgg	cgtag		2445

<210> 35  
 <211> 814  
 <212> PRT  
 <213> Ginkgo biloba

<400> 35

Met Ser Ala Ala Glu Thr Arg Pro Asp Gln Leu Pro Gln Glu Glu Arg  
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Phe Val Ser Arg Leu Asn Ala Asp Tyr His Pro Ala Val Trp Lys Asp  
 20 25 30

Asp Phe Ile Asp Ser Leu Thr Ser Pro Asn Ser His Ala Thr Ser Lys  
 35 40 45

Ser Ser Val Asp Glu Thr Ile Asn Lys Arg Ile Gln Thr Leu Val Lys  
 50 55 60

Glu Ile Gln Cys Met Phe Gln Ser Met Gly Asp Gly Glu Thr Asn Pro  
65 70 75 80

Ser Ala Tyr Asp Thr Ala Trp Val Ala Arg Ile Pro Ser Ile Asp Gly  
85 90 95

Ser Gly Ala Pro Gln Phe Pro Gln Thr Leu Gln Trp Ile Leu Asn Asn  
100 105 110

Gln Leu Pro Asp Gly Ser Trp Gly Glu Glu Cys Ile Phe Leu Ala Tyr  
115 120 125

Asp Arg Val Leu Asn Thr Leu Ala Cys Leu Leu Thr Leu Lys Ile Trp  
130 135 140

Asn Lys Gly Asp Ile Gln Val Gln Lys Gly Val Glu Phe Val Arg Lys  
145 150 155 160

His Met Glu Glu Met Lys Asp Glu Ala Asp Asn His Arg Pro Ser Gly  
165 170 175

Phe Glu Val Val Phe Pro Ala Met Leu Asp Glu Ala Lys Ser Leu Gly  
180 185 190

Leu Asp Leu Pro Tyr His Leu Pro Phe Ile Ser Gln Ile His Gln Lys  
195 200 205

Arg Gln Lys Lys Leu Gln Lys Ile Pro Leu Asn Val Leu His Asn His  
210 215 220

Gln Thr Ala Leu Leu Tyr Ser Leu Glu Gly Leu Gln Asp Val Val Asp  
225 230 235 240

Trp Gln Glu Ile Thr Asn Leu Gln Ser Arg Asp Gly Ser Phe Leu Ser  
245 250 255

Ser Pro Ala Ser Thr Ala Cys Val Phe Met His Thr Gln Asn Lys Arg  
260 265 270

Cys Leu His Phe Leu Asn Phe Val Leu Ser Lys Phe Gly Asp Tyr Val  
275 280 285

Pro Cys His Tyr Pro Leu Asp Leu Phe Glu Arg Leu Trp Ala Val Asp  
290 295 300

Thr Val Glu Arg Leu Gly Ile Asp Arg Tyr Phe Lys Lys Glu Ile Lys  
305 310 315 320

Glu Ser Leu Asp Tyr Val Tyr Arg Tyr Trp Asp Ala Glu Arg Gly Val  
325 330 335

Gly Trp Ala Arg Cys Asn Pro Ile Pro Asp Val Asp Asp Thr Ala Met  
340 345 350

Gly Leu Arg Ile Leu Arg Leu His Gly Tyr Asn Val Ser Ser Asp Val  
355 360 365

Leu Glu Asn Phe Arg Asp Glu Lys Gly Asp Phe Phe Cys Phe Ala Gly  
370 375 380

Gln Thr Gln Ile Gly Val Thr Asp Asn Leu Asn Leu Tyr Arg Cys Ser  
385 390 395 400

Gln Val Cys Phe Pro Gly Glu Lys Ile Met Glu Glu Ala Lys Thr Phe  
405 410 415

Thr Thr Asn His Leu Gln Asn Ala Leu Ala Lys Asn Asn Ala Phe Asp  
420 425 430

Lys Trp Ala Val Lys Lys Asp Leu Pro Gly Glu Val Glu Tyr Ala Ile  
435 440 445

Lys Tyr Pro Trp His Arg Ser Met Pro Arg Leu Glu Ala Arg Ser Tyr  
450 455 460

Ile Glu Gln Phe Gly Ser Asn Asp Val Trp Leu Gly Lys Thr Val Tyr  
465 470 475 480

Lys Met Leu Tyr Val Ser Asn Glu Lys Tyr Leu Glu Leu Ala Lys Leu  
485 490 495

Asp Phe Asn Met Val Gln Ala Leu His Gln Lys Glu Thr Gln His Ile  
500 505 510

Val Ser Trp Trp Arg Glu Ser Gly Phe Asn Asp Leu Thr Phe Thr Arg  
515 520 525

Gln Arg Pro Val Glu Met Tyr Phe Ser Val Ala Val Ser Met Phe Glu  
530 535 540

Pro Glu Phe Ala Ala Cys Arg Ile Ala Tyr Ala Lys Thr Ser Cys Leu

545 550 555 560

Ala Val Ile Leu Asp Asp Leu Tyr Asp Thr His Gly Ser Leu Asp Asp  
565 570 575

Leu Lys Leu Phe Ser Glu Ala Val Arg Arg Trp Asp Ile Ser Val Leu  
580 585 590

Asp Ser Val Arg Asp Asn Gln Leu Lys Val Cys Phe Leu Gly Leu Tyr  
595 600 605

Asn Thr Val Asn Gly Phe Gly Lys Asp Gly Leu Lys Glu Gln Gly Arg  
610 615 620

Asp Val Leu Gly Tyr Leu Arg Lys Val Trp Glu Gly Leu Leu Ala Ser  
625 630 635 640

Tyr Thr Lys Glu Ala Glu Trp Ser Ala Ala Lys Tyr Val Pro Thr Phe  
645 650 655

Asn Glu Tyr Val Glu Asn Ala Lys Val Ser Ile Ala Leu Ala Thr Val  
660 665 670

Val Leu Asn Ser Ile Phe Phe Thr Gly Glu Leu Leu Pro Asp Tyr Ile  
675 680 685

Leu Gln Gln Val Asp Leu Arg Ser Lys Phe Leu His Leu Val Ser Leu  
690 695 700

Thr Gly Arg Leu Ile Asn Asp Thr Lys Thr Tyr Gln Ala Glu Arg Asn  
705 710 715 720

Arg Gly Glu Leu Val Ser Ser Val Gln Cys Tyr Met Arg Glu Asn Pro  
725 730 735

Glu Cys Thr Glu Glu Ala Leu Ser His Val Tyr Gly Ile Ile Asp  
740 745 750

Asn Ala Leu Lys Glu Leu Asn Trp Glu Leu Ala Asn Pro Ala Ser Asn  
755 760 765

Ala Pro Leu Cys Val Arg Arg Leu Leu Phe Asn Thr Ala Arg Val Met  
770 775 780

Gln Leu Phe Tyr Met Tyr Arg Asp Gly Phe Gly Ile Ser Asp Lys Glu  
785 790 795 800

Met Lys Asp His Val Ser Arg Thr Leu Phe Asp Pro Val Ala  
805 810

<210> 36  
<211> 2388  
<212> DNA  
<213> *Ginkgo biloba*

<400> 36  
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cagacattgg tgaaggaaat ccagtgcgt tttcagtcca tggcgacgg tgaaacgaat 180  
ccatctgcgt atgatacagc ttgggtggca agaattccgt caattgacgg ctctggcg 240  
ccccaaatttc cccaaacgct tcaatggatt ctgaacaatc aactgccaga tggctcg 300  
ggtgaggagt gcattttctt ggcgtatgac agagttttaa acactctcg ctgcctcc 360  
actctcaaaa tatggaataa gggcgacatt caagtgcaga aagggttga gtttgtgaga 420  
aaacacatgg aagaaatgaa ggacgaagct gacaatcaca gccaagtgg attcgaggc 480  
gtgtttctg caatgtttaga tgaagcaaaa agcttggat tggatcttcc ttatcacctc 540  
cctttcatct cccaaatcca cccaaagcgc cagaaaaagc ttcaaaagat tcccctcaat 600  
gttcttcata accatcagac ggcgttgctc tactctctgg agggtttgc agatgtgg 660  
gactggcaag agatcacaaa tcttcaatca agagacggat catttttaag ctcccctgca 720  
tctactgctt gtgtcttcat gcacactcaa aacaaacgat gcctccactt tctcaacttc 780  
gtgctcagca aatttggcga ctacgttct tgccattacc cacttgatct atttgaacgc 840  
ctctggctg tcgatacagt tgaacgctt ggaatcgatc gctatttcaa gaaagaaatc 900  
aaagaatctc tggattacagt ttataggtac tggacgccc aaagaggcgt gggatggc 960  
agatgcaatc ctattcctga tgcgtatgac actgccatgg gtcttagaat cctgagactt 1020  
catggataca atgtatcttc agatgttctg gagaatttca gagacgagaa aggagacttc 1080  
ttttgctttg ccggtaaac gcaaatttgtt gtgaccgata atcttaacct ttatagatgt 1140  
tcacaagtat gtttccggg agaaaagata atggaagaag ctaagacctt cactacaaat 1200  
catctccaaa atgctttgc cccaaacaac gcatttgata agtggctgt caagaaggat 1260  
cttcctggag aggtggagta tgctataaag tatccgtggc atagaagtat gccaagattg 1320  
gaggcaagaa gttacataga gcaatttggaa tcaaattgtatg tctggctggg gaagactgtg 1380  
tataagatgc tataatgtgag caacgaaaaa tatttggagc tggccaaattt ggacttcaat 1440  
atggtgcagg ctttacacca aaaggagact caacacatttgc tcaagctggc gagagaatcg 1500

ggattcaatg atcttacatt caccggccag cggcctgtgg aaatgtattt ctcagtggcg 1560  
 gttagtatgt ttgagccaga attcgctgct tgtagaattt cctatgccaa gacttcttgc 1620  
 ctcgcagtta ttcttagacga tctttacgac acccacggat ctctggatga tcttaattt 1680  
 ttctctgaag cggtccgaag atggatatc tctgtgctgg atagcgttcg ggataatcag 1740  
 ttgaaagttt gcttcctagg gctgtacaac acagtgaatg gatttgaaa agatggactc 1800  
 aaggaacaag gccgtatgt gctggctat cttcgaaaag tatgggaggg ctgctcgca 1860  
 tcgtataccca aagaagccga atggtcggca gcaaagtatg tgccgacatt caacgaatat 1920  
 gtggaaaatg ccaaagtgtc catagcactt gcgcacagtgc tactaaactc aatcttttc 1980  
 actggagaat tacttcctga ttacattttt cagcaagtag accttcggc caaatttctg 2040  
 catcttgtgt ctggactgg acgactaattc aatgacacca agacttacca ggccgagaga 2100  
 aaccgtggtg aattggtttc cagcgtacag tgctacatga gggaaaatcc ggagtgcaca 2160  
 gaggaagaag ctctaagtca tgtttatggt atcatcgaca acgcactgaa ggaattgaat 2220  
 tgggagttgg ccaaccagc gagcaatgcc ccattgtgtg tgagaagact gctgttcaac 2280  
 actgcaagag tcatgcagct gtttatatg tacagagatg gcttggat ctctgacaaa 2340  
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<210> 37  
 <211> 795  
 <212> PRT  
 <213> Ginkgo biloba  
  
 <400> 37

Met Leu Asn Ala Asp Tyr His Pro Ala Val Trp Lys Asp Asp Phe Ile  
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Asp Ser Leu Thr Ser Pro Asn Ser His Ala Thr Ser Lys Ser Ser Val  
 20 25 30

Asp Glu Thr Ile Asn Lys Arg Ile Gln Thr Leu Val Lys Glu Ile Gln  
 35 40 45

Cys Met Phe Gln Ser Met Gly Asp Gly Glu Thr Asn Pro Ser Ala Tyr  
 50 55 60

Asp Thr Ala Trp Val Ala Arg Ile Pro Ser Ile Asp Gly Ser Gly Ala  
 65 70 75 80

Pro Gln Phe Pro Gln Thr Leu Gln Trp Ile Leu Asn Asn Gln Leu Pro  
 85 90 95

Asp Gly Ser Trp Gly Glu Glu Cys Ile Phe Leu Ala Tyr Asp Arg Val  
100 105 110

Leu Asn Thr Leu Ala Cys Leu Leu Thr Leu Lys Ile Trp Asn Lys Gly  
115 120 125

Asp Ile Gln Val Gln Lys Gly Val Glu Phe Val Arg Lys His Met Glu  
130 135 140

Glu Met Lys Asp Glu Ala Asp Asn His Arg Pro Ser Gly Phe Glu Val  
145 150 155 160

Val Phe Pro Ala Met Leu Asp Glu Ala Lys Ser Leu Gly Leu Asp Leu  
165 170 175

Pro Tyr His Leu Pro Phe Ile Ser Gln Ile His Gln Lys Arg Gln Lys  
180 185 190

Lys Leu Gln Lys Ile Pro Leu Asn Val Leu His Asn His Gln Thr Ala  
195 200 205

Leu Leu Tyr Ser Leu Glu Gly Leu Gln Asp Val Val Asp Trp Gln Glu  
210 215 220

Ile Thr Asn Leu Gln Ser Arg Asp Gly Ser Phe Leu Ser Ser Pro Ala  
225 230 235 240

Ser Thr Ala Cys Val Phe Met His Thr Gln Asn Lys Arg Cys Leu His  
245 250 255

Phe Leu Asn Phe Val Leu Ser Lys Phe Gly Asp Tyr Val Pro Cys His  
260 265 270

Tyr Pro Leu Asp Leu Phe Glu Arg Leu Trp Ala Val Asp Thr Val Glu  
275 280 285

Arg Leu Gly Ile Asp Arg Tyr Phe Lys Lys Glu Ile Lys Glu Ser Leu  
290 295 300

Asp Tyr Val Tyr Arg Tyr Trp Asp Ala Glu Arg Gly Val Gly Trp Ala  
305 310 315 320

Arg Cys Asn Pro Ile Pro Asp Val Asp Asp Thr Ala Met Gly Leu Arg  
325 330 335

Ile Leu Arg Leu His Gly Tyr Asn Val Ser Ser Asp Val Leu Glu Asn  
340 345 350

Phe Arg Asp Glu Lys Gly Asp Phe Phe Cys Phe Ala Gly Gln Thr Gln  
355 360 365

Ile Gly Val Thr Asp Asn Leu Asn Leu Tyr Arg Cys Ser Gln Val Cys  
370 375 380

Phe Pro Gly Glu Lys Ile Met Glu Glu Ala Lys Thr Phe Thr Thr Asn  
385 390 395 400

His Leu Gln Asn Ala Leu Ala Lys Asn Asn Ala Phe Asp Lys Trp Ala  
405 410 415

Val Lys Lys Asp Leu Pro Gly Glu Val Glu Tyr Ala Ile Lys Tyr Pro  
420 425 430

Trp His Arg Ser Met Pro Arg Leu Glu Ala Arg Ser Tyr Ile Glu Gln  
435 440 445

Phe Gly Ser Asn Asp Val Trp Leu Gly Lys Thr Val Tyr Lys Met Leu  
450 455 460

Tyr Val Ser Asn Glu Lys Tyr Leu Glu Leu Ala Lys Leu Asp Phe Asn  
465 470 475 480

Met Val Gln Ala Leu His Gln Lys Glu Thr Gln His Ile Val Ser Trp  
485 490 495

Trp Arg Glu Ser Gly Phe Asn Asp Leu Thr Phe Thr Arg Gln Arg Pro  
500 505 510

Val Glu Met Tyr Phe Ser Val Ala Val Ser Met Phe Glu Pro Glu Phe  
515 520 525

Ala Ala Cys Arg Ile Ala Tyr Ala Lys Thr Ser Cys Leu Ala Val Ile  
530 535 540

Leu Asp Asp Leu Tyr Asp Thr His Gly Ser Leu Asp Asp Leu Lys Leu  
545 550 555 560

Phe Ser Glu Ala Val Arg Arg Trp Asp Ile Ser Val Leu Asp Ser Val  
565 570 575

Arg Asp Asn Gln Leu Lys Val Cys Phe Leu Gly Leu Tyr Asn Thr Val  
580 585 590

Asn Gly Phe Gly Lys Asp Gly Leu Lys Glu Gln Gly Arg Asp Val Leu  
595 600 605

Gly Tyr Leu Arg Lys Val Trp Glu Gly Leu Leu Ala Ser Tyr Thr Lys  
610 615 620

Glu Ala Glu Trp Ser Ala Ala Lys Tyr Val Pro Thr Phe Asn Glu Tyr  
625 630 635 640

Val Glu Asn Ala Lys Val Ser Ile Ala Leu Ala Thr Val Val Leu Asn  
645 650 655

Ser Ile Phe Phe Thr Gly Glu Leu Leu Pro Asp Tyr Ile Leu Gln Gln  
660 665 670

Val Asp Leu Arg Ser Lys Phe Leu His Leu Val Ser Leu Thr Gly Arg  
675 680 685

Leu Ile Asn Asp Thr Lys Thr Tyr Gln Ala Glu Arg Asn Arg Gly Glu  
690 695 700

Leu Val Ser Ser Val Gln Cys Tyr Met Arg Glu Asn Pro Glu Cys Thr  
705 710 715 720

Glu Glu Glu Ala Leu Ser His Val Tyr Gly Ile Ile Asp Asn Ala Leu  
725 730 735

Lys Glu Leu Asn Trp Glu Leu Ala Asn Pro Ala Ser Asn Ala Pro Leu  
740 745 750

Cys Val Arg Arg Leu Leu Phe Asn Thr Ala Arg Val Met Gln Leu Phe  
755 760 765

Tyr Met Tyr Arg Asp Gly Phe Gly Ile Ser Asp Lys Glu Met Lys Asp  
770 775 780

His Val Ser Arg Thr Leu Phe Asp Pro Val Ala  
785 790 795

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<211> 2241  
<212> DNA  
<213> Ginkgo biloba

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attctgaaca atcaactgcc agatggctcg tgggtgagg agtgcatttt tctggcgtat	180
gacagagttt taaacactct cgcctgcctc ctcactctca aaatatggaa taagggcgac	240
attcaagtgc agaaagggt tgagtttgag agaaaacaca tggaaagaaat gaaggacgaa	300
gctgacaatc acaggccaag tggattcgag gtcgtgttc ctgcaatgtt agatgaagca	360
aaaagcttgg gattggatct tccttatacac ctcccttca tctcccaaatt ccaccaaaag	420
cgccagaaaaa agcttcaaaa gattcccctc aatgttcttc ataaccatca gacggcggtt	480
ctctactctc tggagggttt gcaagatgtg gtggactggc aagagatcac aaatcttcaa	540
tcaagagacg gatcatttt aagctcccct gcatctactg cttgtgtctt catgcacact	600
caaaacaaac gatgcctcca ctttctcaac ttcgtgctca gcaaatttgg cgactacgtt	660
ccttgcatt acccacttga tctatttga cgcctctggg ctgtcgatac agttgaacgc	720
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tactggacg ccgaaagagg cgtggatgg gcaagatgca atcctattcc tgatgtcgat	840
gacactgcca tgggtcttag aatcctgaga cttcatggat acaatgtatc ttcagatgtt	900
ctggagaatt tcagagacga gaaaggagac ttctttgct ttgccggtca aacgcaaatt	960
ggtgtgaccg ataatcttaa cctttataga ttttcacaag tatgtttcc gggagaaaaag	1020
ataatggaag aagctaagac cttcactaca aatcatctcc aaaatgctct tgccaaaaac	1080
aacgcattt gtaatgggc tgtcaagaag gatcttcctg gagaggtgga gtatgtata	1140
aagtatccgt ggcataagaat tatgccaaga ttggaggcaa gaagttacat agagcaattt	1200
ggatcaaatg atgtctggct gggaaagact gtgtataaga tgctatatgt gagcaacgaa	1260
aaatatttgg agctggccaa attggacttc aatatggtgc aggccttaca ccaaaaggag	1320
actcaacaca ttgtcagctg gtggagagaa tcgggattca atgatcttac attcaccgc	1380
cagcggcctg tggaaatgta tttctcagtg gcggtagta ttttgagcc agaattcgct	1440
gctttagaa ttgcctatgc caagacttct tgcctcgag ttattctaga cgatcttac	1500
gacacccacg gatctctgga tgatctaaa ttgttctctg aagcggtccg aagatggat	1560
atctctgtgc tggatagcgt tcgggataat cagttgaaag tttgcttcct aggctgtac	1620
aacacagtga atggatttgg aaaagatgga ctcaaggaac aaggccgtga tgtgctggc	1680
tatcttcgaa aagtatggaa gggcttgctc gcatcgtata ccaaagaagc cgaatggtcg	1740
gcagcaaagt atgtgccgac attcaacgaa tatgtggaaa atgccaaagt gtccatagca	1800

cttgcacat tcgtactaaa ctcaatctt ttcactggag aattacttcc tgattacatt 1860  
ttacagcaag tagaccttcg gtccaaattt ctgcacatctt tgcattttgac tggacgacta 1920  
atcaatgaca ccaagactta ccaggccgag agaaaccgtg gtgaattgggt ttccagcgta 1980  
cagtgctaca tgagggaaaa tccggagtgc acagaggaag aagctctaag tcatgtttat 2040  
ggtatcatcg acaacgcact gaaggaattt aattgggagt tggccaaacc agcgagcaat 2100  
gccccattgt gtgtgagaag actgctgttc aacactgcaa gagtgatgca gctgtttat 2160  
atgtacagag atggctttgg tatctctgac aaagagatga aagaccatgt cagccgaact 2220  
ctttcgatc ctgtggcgta g 2241

<210> 39

<211> 746

<212> PRT

<213> Ginkgo biloba

<400> 39

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Thr Ala Trp Val Ala Arg Ile Pro Ser Ile Asp Gly Ser Gly Ala Pro  
20 25 30

Gln Phe Pro Gln Thr Leu Gln Trp Ile Leu Asn Asn Gln Leu Pro Asp  
35 40 45

Gly Ser Trp Gly Glu Glu Cys Ile Phe Leu Ala Tyr Asp Arg Val Leu  
50 55 60

Asn Thr Leu Ala Cys Leu Leu Thr Leu Lys Ile Trp Asn Lys Gly Asp  
65 70 75 80

Ile Gln Val Gln Lys Gly Val Glu Phe Val Arg Lys His Met Glu Glu  
85 90 95

Met Lys Asp Glu Ala Asp Asn His Arg Pro Ser Gly Phe Glu Val Val  
100 105 110

Phe Pro Ala Met Leu Asp Glu Ala Lys Ser Leu Gly Leu Asp Leu Pro  
115 120 125

Tyr His Leu Pro Phe Ile Ser Gln Ile His Gln Lys Arg Gln Lys Lys  
130 135 140

Leu Gln Lys Ile Pro Leu Asn Val Leu His Asn His Gln Thr Ala Leu

145 150 155 160

Leu Tyr Ser Leu Glu Gly Leu Gln Asp Val Val Asp Trp Gln Glu Ile  
165 170 175

Thr Asn Leu Gln Ser Arg Asp Gly Ser Phe Leu Ser Ser Pro Ala Ser  
180 185 190

Thr Ala Cys Val Phe Met His Thr Gln Asn Lys Arg Cys Leu His Phe  
195 200 205

Leu Asn Phe Val Leu Ser Lys Phe Gly Asp Tyr Val Pro Cys His Tyr  
210 215 220

Pro Leu Asp Leu Phe Glu Arg Leu Trp Ala Val Asp Thr Val Glu Arg  
225 230 235 240

Leu Gly Ile Asp Arg Tyr Phe Lys Lys Glu Ile Lys Glu Ser Leu Asp  
245 250 255

Tyr Val Tyr Arg Tyr Trp Asp Ala Glu Arg Gly Val Gly Trp Ala Arg  
260 265 270

Cys Asn Pro Ile Pro Asp Val Asp Asp Thr Ala Met Gly Leu Arg Ile  
275 280 285

Leu Arg Leu His Gly Tyr Asn Val Ser Ser Asp Val Leu Glu Asn Phe  
290 295 300

Arg Asp Glu Lys Gly Asp Phe Phe Cys Phe Ala Gly Gln Thr Gln Ile  
305 310 315 320

Gly Val Thr Asp Asn Leu Asn Leu Tyr Arg Cys Ser Gln Val Cys Phe  
325 330 335

Pro Gly Glu Lys Ile Met Glu Glu Ala Lys Thr Phe Thr Thr Asn His  
340 345 350

Leu Gln Asn Ala Leu Ala Lys Asn Asn Ala Phe Asp Lys Trp Ala Val  
355 360 365

Lys Lys Asp Leu Pro Gly Glu Val Glu Tyr Ala Ile Lys Tyr Pro Trp  
370 375 380

His Arg Ser Met Pro Arg Leu Glu Ala Arg Ser Tyr Ile Glu Gln Phe  
385 390 395 400

Gly Ser Asn Asp Val Trp Leu Gly Lys Thr Val Tyr Lys Met Leu Tyr  
405 410 415

Val Ser Asn Glu Lys Tyr Leu Glu Leu Ala Lys Leu Asp Phe Asn Met  
420 425 430

Val Gln Ala Leu His Gln Lys Glu Thr Gln His Ile Val Ser Trp Trp  
435 440 445

Arg Glu Ser Gly Phe Asn Asp Leu Thr Phe Thr Arg Gln Arg Pro Val  
450 455 460

Glu Met Tyr Phe Ser Val Ala Val Ser Met Phe Glu Pro Glu Phe Ala  
465 470 475 480

Ala Cys Arg Ile Ala Tyr Ala Lys Thr Ser Cys Leu Ala Val Ile Leu  
485 490 495

Asp Asp Leu Tyr Asp Thr His Gly Ser Leu Asp Asp Leu Lys Leu Phe  
500 505 510

Ser Glu Ala Val Arg Arg Trp Asp Ile Ser Val Leu Asp Ser Val Arg  
515 520 525

Asp Asn Gln Leu Lys Val Cys Phe Leu Gly Leu Tyr Asn Thr Val Asn  
530 535 540

Gly Phe Gly Lys Asp Gly Leu Lys Glu Gln Gly Arg Asp Val Leu Gly  
545 550 555 560

Tyr Leu Arg Lys Val Trp Glu Gly Leu Leu Ala Ser Tyr Thr Lys Glu  
565 570 575

Ala Glu Trp Ser Ala Ala Lys Tyr Val Pro Thr Phe Asn Glu Tyr Val  
580 585 590

Glu Asn Ala Lys Val Ser Ile Ala Leu Ala Thr Val Val Leu Asn Ser  
595 600 605

Ile Phe Phe Thr Gly Glu Leu Leu Pro Asp Tyr Ile Leu Gln Gln Val  
610 615 620

Asp Leu Arg Ser Lys Phe Leu His Leu Val Ser Leu Thr Gly Arg Leu  
625 630 635 640

Ile Asn Asp Thr Lys Thr Tyr Gln Ala Glu Arg Asn Arg Gly Glu Leu  
645 650 655

Val Ser Ser Val Gln Cys Tyr Met Arg Glu Asn Pro Glu Cys Thr Glu  
660 665 670

Glu Glu Ala Leu Ser His Val Tyr Gly Ile Ile Asp Asn Ala Leu Lys  
675 680 685

Glu Leu Asn Trp Glu Leu Ala Asn Pro Ala Ser Asn Ala Pro Leu Cys  
690 695 700

Val Arg Arg Leu Leu Phe Asn Thr Ala Arg Val Met Gln Leu Phe Tyr  
705 710 715 720

Met Tyr Arg Asp Gly Phe Gly Ile Ser Asp Lys Glu Met Lys Asp His  
725 730 735

Val Ser Arg Thr Leu Phe Asp Pro Val Ala  
740 745

<210> 40  
<211> 53  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Primer

<400> 40  
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<210> 41  
<211> 862  
<212> PRT  
<213> Taxus brevifolia

<400> 41

Met Ala Gln Leu Ser Phe Asn Ala Ala Leu Lys Met Asn Ala Leu Gly  
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Asn Lys Ala Ile His Asp Pro Thr Asn Cys Arg Ala Lys Ser Glu Arg  
20 25 30

Gln Met Met Trp Val Cys Ser Arg Ser Gly Arg Thr Arg Val Lys Met  
35 40 45

Ser Arg Gly Ser Gly Gly Pro Gly Pro Val Val Met Met Ser Ser Ser

50

55

60

Thr Gly Thr Ser Lys Val Val Ser Glu Thr Ser Ser Thr Ile Val Asp  
65 70 75 80

Asp Ile Pro Arg Leu Ser Ala Asn Tyr His Gly Asp Leu Trp His His  
85 90 95

Asn Val Ile Gln Thr Leu Glu Thr Pro Phe Arg Glu Ser Ser Thr Tyr  
100 105 110

Gln Glu Arg Ala Asp Glu Leu Val Val Lys Ile Lys Asp Met Phe Asn  
115 120 125

Ala Leu Gly Asp Gly Asp Ile Ser Pro Ser Ala Tyr Asp Thr Ala Trp  
130 135 140

Val Ala Arg Leu Ala Thr Ile Ser Ser Asp Gly Ser Glu Lys Pro Arg  
145 150 155 160

Phe Pro Gln Ala Leu Asn Trp Val Phe Asn Asn Gln Leu Gln Asp Gly  
165 170 175

Ser Trp Gly Ile Glu Ser His Phe Ser Leu Cys Asp Arg Leu Leu Asn  
180 185 190

Thr Thr Asn Ser Val Ile Ala Leu Ser Val Trp Lys Thr Gly His Ser  
195 200 205

Gln Val Gln Gln Gly Ala Glu Phe Ile Ala Glu Asn Leu Arg Leu Leu  
210 215 220

Asn Glu Glu Asp Glu Leu Ser Pro Asp Phe Gln Ile Ile Phe Pro Ala  
225 230 235 240

Leu Leu Gln Lys Ala Lys Ala Leu Gly Ile Asn Leu Pro Tyr Asp Leu  
245 250 255

Pro Phe Ile Lys Tyr Leu Ser Thr Thr Arg Glu Ala Arg Leu Thr Asp  
260 265 270

Val Ser Ala Ala Ala Asp Asn Ile Pro Ala Asn Met Leu Asn Ala Leu  
275 280 285

Glu Gly Leu Glu Glu Val Ile Asp Trp Asn Lys Ile Met Arg Phe Gln  
290 295 300

Ser Lys Asp Gly Ser Phe Leu Ser Ser Pro Ala Ser Thr Ala Cys Val  
305 310 315 320

Leu Met Asn Thr Gly Asp Glu Lys Cys Phe Thr Phe Leu Asn Asn Leu  
325 330 335

Leu Asp Lys Phe Gly Gly Cys Val Pro Cys Met Tyr Ser Ile Asp Leu  
340 345 350

Leu Glu Arg Leu Ser Leu Val Asp Asn Ile Glu His Leu Gly Ile Gly  
355 360 365

Arg His Phe Lys Gln Glu Ile Lys Gly Ala Leu Asp Tyr Val Tyr Arg  
370 375 380

His Trp Ser Glu Arg Gly Ile Gly Trp Gly Arg Asp Ser Leu Val Pro  
385 390 395 400

Asp Leu Asn Thr Thr Ala Leu Gly Leu Arg Thr Leu Arg Met His Gly  
405 410 415

Tyr Asn Val Ser Ser Asp Val Leu Asn Asn Phe Lys Asp Glu Asn Gly  
420 425 430

Arg Phe Phe Ser Ser Ala Gly Gln Thr His Val Glu Leu Arg Ser Val  
435 440 445

Val Asn Leu Phe Arg Ala Ser Asp Leu Ala Phe Pro Asp Glu Arg Ala  
450 455 460

Met Asp Asp Ala Arg Lys Phe Ala Glu Pro Tyr Leu Arg Glu Ala Leu  
465 470 475 480

Ala Thr Lys Ile Ser Thr Asn Thr Lys Leu Phe Lys Glu Ile Glu Tyr  
485 490 495

Val Val Glu Tyr Pro Trp His Met Ser Ile Pro Arg Leu Glu Ala Arg  
500 505 510

Ser Tyr Ile Asp Ser Tyr Asp Asp Asn Tyr Val Trp Gln Arg Lys Thr  
515 520 525

Leu Tyr Arg Met Pro Ser Leu Ser Asn Ser Lys Cys Leu Glu Leu Ala  
530 535 540

Lys Leu Asp Phe Asn Ile Val Gln Ser Leu His Gln Glu Glu Leu Lys  
545 550 555 560

Leu Leu Thr Arg Trp Trp Lys Glu Ser Gly Met Ala Asp Ile Asn Phe  
565 570 575

Thr Arg His Arg Val Ala Glu Val Tyr Phe Ser Ser Ala Thr Phe Glu  
580 585 590

Pro Glu Tyr Ser Ala Thr Arg Ile Ala Phe Thr Lys Ile Gly Cys Leu  
595 600 605

Gln Val Leu Phe Asp Asp Met Ala Asp Ile Phe Ala Thr Leu Asp Glu  
610 615 620

Leu Lys Ser Phe Thr Glu Gly Val Lys Arg Trp Asp Thr Ser Leu Leu  
625 630 635 640

His Glu Ile Pro Glu Cys Met Gln Thr Cys Phe Lys Val Trp Phe Lys  
645 650 655

Leu Met Glu Glu Val Asn Asn Asp Val Val Lys Val Gln Gly Arg Asp  
660 665 670

Met Leu Ala His Ile Arg Lys Pro Trp Glu Leu Tyr Phe Asn Cys Tyr  
675 680 685

Val Gln Glu Arg Glu Trp Leu Glu Ala Gly Tyr Ile Pro Thr Phe Glu  
690 695 700

Glu Tyr Leu Lys Thr Tyr Ala Ile Ser Val Gly Leu Gly Pro Cys Thr  
705 710 715 720

Leu Gln Pro Ile Leu Leu Met Gly Glu Leu Val Lys Asp Asp Val Val  
725 730 735

Glu Lys Val His Tyr Pro Ser Asn Met Phe Glu Leu Val Ser Leu Ser  
740 745 750

Trp Arg Leu Thr Asn Asp Thr Lys Thr Tyr Gln Ala Glu Lys Ala Arg  
755 760 765

Gly Gln Gln Ala Ser Gly Ile Ala Cys Tyr Met Lys Asp Asn Pro Gly  
770 775 780

Ala Thr Glu Glu Asp Ala Ile Lys His Ile Cys Arg Val Val Asp Arg  
785 790 795 800

Ala Leu Lys Glu Ala Ser Phe Glu Tyr Phe Lys Pro Ser Asn Asp Ile  
805 810 815

Pro Met Gly Cys Lys Ser Phe Ile Phe Asn Leu Arg Leu Cys Val Gln  
820 825 830

Ile Phe Tyr Lys Phe Ile Asp Gly Tyr Gly Ile Ala Asn Glu Glu Ile  
835 840 845

Lys Asp Tyr Ile Arg Lys Val Tyr Ile Asp Pro Ile Gln Val  
850 855 860